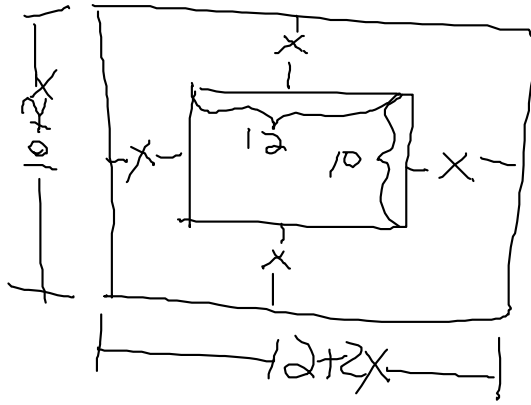


2.5 Solving Quadratic Word Problems

Ex1: A rectangular garden is 10 ft wide and 12 ft long. A walk of uniform width surrounds the garden. If the total area of the garden and the walk is 168 ft^2 , what is the width of the walk?

let x = width of walk (ft)



$$A_{\text{large}} = l_{\text{large}} \cdot w_{\text{large}}$$

$$168 = (12+2x)(10+2x)$$

$$168 = 120 + 44x + 4x^2$$

$$0 = 4x^2 + 44x - 48$$

4

$$0 = x^2 + 11x - 12$$

$$0 = (x+12)(x-1)$$

$$\cancel{x = -12} \quad x = 1$$

Ex2:

Two scientists are working on a special project. The experienced scientist can complete the project in 2 hrs less than the other scientist. Together they were able to complete the job in 2.4 hrs. How long would it take the experienced scientist to do the job alone?

let X = amt time exp. Sci. need to do job alone (hrs)

$X+2$ = amt time in exp needs (hrs)

| | Rate $\frac{\text{part}}{\text{hr}}$ | time (hrs) | Part Comp |
|--------|--------------------------------------|------------|-------------------|
| Exp | $\frac{1}{X}$ | 2.4 | $\frac{2.4}{X}$ |
| In exp | $\frac{1}{X+2}$ | 2.4 | $\frac{2.4}{X+2}$ |

part done by exp. in 2.4 hr + part done by in exp in 2.4 = Whole

$$X(X+2) \left(\frac{2.4}{X} + \frac{2.4}{X+2} = 1 \right)$$

$2.4(X+2) + 2.4X = X(X+2)$

$$2.4(x+2) + 2.4x = x(x+2)$$

$$24(x+2) + 24x = 10x(x+2)$$

4 hrs

$$0 = 10x^2 - 28x - 48$$

$$0 = 5x^2 - 14x - 24$$

$$0 = (5x + 6)(x - 4)$$

$$x = -6/5, \quad x = 4$$

Ex. 3:

A jumbo chocolate bar with a rectangular shape measures 12 cm in length, 7 cm in width, and 3 cm in thickness. Due to escalating costs of cocoa, management decides to reduce the volume of the bar by 10%. To accomplish this reduction, management decides that the new bar should have the same thickness, but the length and width each should be reduced an equal number of centimeters. What should be the dimensions of the new bar? Round your answer to the nearest hundredth.

$$Vol_{original} = 12 \cdot 7 \cdot 3 = 252 \text{ cm}^3$$

let x = amt of reduction in l + w (cm)

$12 - x$ = new length

$7 - x$ = new width

new volume = 90% old vol.

$$(12 - x)(7 - x)(3) = .9(252)$$

$$6.8 \times 28 \times 3 = 0 = x^2 - 19x + 21$$

$$x = \cancel{17.9}, \quad 215$$